Contribution ID: **48** Type: **not specified**

Non-uniqueness of spherical black holes in five dimensions

Friday, 24 May 2024 16:45 (15 minutes)

Black holes are not unique in higher dimensions. It is well known that, in five dimensions, stationary, biaxisymmetric black holes with the horizon of S^3-topology and $S^2 \times S^1$-topology can exist for the same asymptotic charges, in contrast to the black holes in four dimensions where the horizon must have S^2-topology.

In this talk, we aim to demonstrate that even if the horizon topology is fixed to be S^3, the black hole in five dimensions is still not unique in terms of asymptotic charges.For this, we present a new type of spherical black hole endowed with a nontrivial spacetime structure called "bubble" attached on the horizon [1].The new spherical black hole, which we call a "capped black hole", is the non-BPS solution of five-dimensional minimal supergravity, constructed by the combination of two different solution generating techniques: the inverse scattering method and electric Harrison transformation [2]. We briefly introduce the basic feature of the new solution and then compare it with the known spherical black hole (Cvetic-Youm black hole). As a result, we show that the two solutions can have the same asymptotic charges, i.e. the uniqueness is violated for the S^3-horizon. Moreover, we find that the new solution can have the larger entropy than the Cvetic-Youm black hole in a certain parameter range.

References

[1] R. Suzuki and S. Tomizawa,
"A Capped Black Hole in Five Dimensions,"
[arXiv:2311.11653 [hep-th]].

[2] R. Suzuki and S. Tomizawa,
"Solution Generation of a Capped Black Hole,"
[arXiv:2403.17796 [hep-th]].

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